Faculty of Engineering

DEVELOPMENT OF DECANTER CAKE INTO COMMERCIAL BY PRODUCT IN SARAWAK

MUHAMAD SHAIEZAD AIMAN BIN AYUB

Bachelor of Engineering with Honours
(Chemical Engineering)
2017

UNIVERSITI MALAYSIA SARAWAK

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This declaration is made on the 29 day of MAY 2017.

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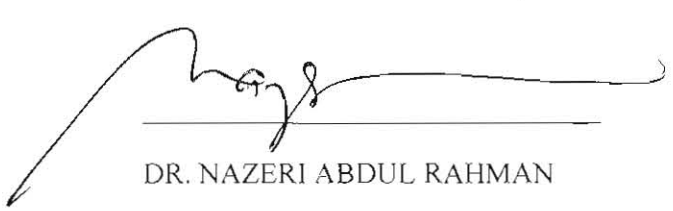

DR. NAZERI ABDUL RAHMAN

(Supervisor)

29 MAY 2017

Date

DEVELOPMENT OF DECANTER CAKE INTO COMMERCIAL BY PRODUCT IN SARAWAK

MUHAMAD SHAIEZAD AIMAN BIN AYUB

A dissertation submitted in partial fulfillment

of the requirement for the degree of

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ABSTRACT

The palm oil production in Malaysia have increase dramatically due to high demand from foreign countries. In Malaysia, there are abundant of biomass wastes produced especially from palm oil industry in which these wastes can be manufactured into new products. During the processing of palm oil mill, significant amount of wastes are produced such as founds, trunk, empty fruit bunch, shells and fiber. These wastes are categorized as biomass wastes. Therefore, this study is conducted to determine the feasibility of utilizing biomass wastes from palm oil mill especially decanter cake as a commercial products particularly as organic and semi-organic fertiliser for oil palm plantation. The study focuses on the state of Sarawak in which a set of questionnaires are developed in order to collect data and information on production of decanter cake produce. In addition, an optimization programing is developed by using matrix method to compare the chemical composition of commercial fertilizer to the decanter cake with organic and inorganic fertiliser especially on percentage of nitrogen, phosphorus and potassium (NPK). Besides that, the produced fertiliser is briquetted and an experiment testing of the product has been conducted to test the ability of fertilizer to absorb water, moisture content of the fertilizer, density and amount of fines produce. It is found that Decanter cake with organic materials are insufficient to supply nutrient as in commercial fertiliser. As such inorganic materials are added to enhance the nutrient composition in which compatible to commercial fertiliser. In term of briquetting properties it found that produced briquette meet the requirement. Therefore, decanter cake feasible to be manufactured as commercial product.

Keywords : palm oil mill, biomass, decanter cake, fertiliser, briquette

ABSTRAK

Pengeluaran minyak sawit di Malaysia terutamanya di Sarawak semakin meningkat disebabkan oleh permintaan yang tinggi dari negara-negara luar. Di Malaysia, sisa-sisa biomass yang paling banyak adalah daripada industri kelapa sawit dan sisa-sisa ini boleh di perbaharui untuk dijadikan bahan baru. Semasa pemprosesan kilang minyak sawit terdapat banyak bahan buangan yang dihasilkan seperti pelepah, batang, tandan buah kosong, tempurung dan serat. Bahan buangan ini adalah salah satu sisa biomass Oleh yang demikian, kajian ini dijalankan untuk menyelidik kebolehan memanfaatkan sisa-sisa biomass daripada industri kelapa sawit khususnya kek decanter kepada produk komersial terutamanya sebagai baja oragnik atau semi organic untuk ladang kelapa sawit. Kajian ini di jalankan di negeri Sarawak dimana kajian soal selidik telah dijalankan untuk mendapatkan maklumat tentang kadar penghasilan kek decanter yang dihasilkan di oleh beberapa buah kilang kelapa sawit di Sarawak. Disamping itu, satu program tentang pengoptimum telah dijalankan dengan menggunakan kaedah matrik untuk membandingkan kandungan kimia baja komersial dan baja kek decanter bersama-sama dengan bahan organik dan tak organic. Kajian tertumpu kepada peratusan nitrogen, fosforus dan kalium (NPK). Selain itu, baja kek decanter yang dihasilkan akan di briket dan kajian experimen juga dijalankan untuk mengkaji tentang kebolehan baja tersebut untuk menyerap air, kandungan lembab, ketumpatan, dan serbuk halus baja. Didapati bahawa Decanter kek dengan bahan-bahan organik tidak mencukupi untuk membekalkan nutrien seperti dalam baja komersial. Sebagai bahan bukan organik seperti ditambah untuk meningkatkan komposisi nutrien dalam yang serasi untuk baja komersial. Dari segi sifat-sifat briquetting ia mendapati bahawa briket yang dihasilkan memenuhi keperluan. Oleh itu, kek decanter layak untuk dikeluarkan sebagai produk komersial.

Kata kunci: kilang kelapa sawit, biomass, kek decanter, baja, briket

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ABBREVIATIONS

AEC	Architecture, Engineering, and Construction
BOD	Biochemical-oxygen-demand
C	Carbon
CaO	Calcium
COD	Chemical-oxygen-demand
CPO	Crude Palm Oil
DC	Decanter Cake
EFB	Empty Fruit Bunches
FFA	Free fatty acid
FFB	Fresh fruit bunches
FRIM	Forest Research Institute Malaysia
H	Hydrogen
K	Potassium
K_2O	Potassium
MDF	Medium density fiber
MF	Mesocarp Fibres
Mg	Magnesium
MPOB	Malaysian Palm Oil Board

MPOC	Malaysian Palm Oil Council
N	Nitrogen
NH_4^+	Ammonia
NPK	Nitrogen, Phosphorus And Potassium
O	Oxygen
OPEFB	Oil palm empty fruit bunch
OPF	Oil Palm Frond
OPF	Oil Palm Fronds
OPM	Oil Palm Mesocarp
OPS	Oil Palm Shell
OPT	Oil Palm Trunks
P	Phosphorus
P_2O_5	Phosphorus
PCK	Palm Kernel Cake
POME	Palm Oil Mill Effluent
PORIM	Palm Oil Research Institute of Malaysia
PPF	Palm Press Fibre
PS	Palm Shell